CLAIMS

1. A needleless port comprising: a pedestal that forms a part of a flow channel and has an opening to the flow channel; a cover that is engaged with the pedestal at a position corresponding to the opening and has a cavity that opens to exterior at a predetermined distance from the opening; and a septum that is held in the cavity and is made of a resilient material with a passageway for allowing an insertion member to be inserted from the exterior to the opening, wherein

the septum comprises a main body that extends from an inner end on the pedestal side toward an outer end on the exterior side of the cavity of the cover, with the passageway being formed between an inner-end face and an outer-end face thereof, and compression ribs provided on sides of the main body,

the main body has a cross section in a direction orthogonal to the passageway of a shape having a dimension in a length direction larger than that in a breadth direction,

the passageway includes a slit and a bore, the slit having a predetermined depth from the outer-end face of the main body and extending in the same direction as the length direction, and the bore extending from the slit to the inner-end face of the main body and having a lateral section of a spindle shape whose major axis extends in the same direction as the length direction,

the compression ribs are provided at the both side ends of the main body in the breadth direction so as to extend along the axial direction of the passageway,

the cavity of the cover has a circular cross section whose diameter is smaller than a distance between the external surfaces of the compression ribs, and

with the septum being held inside the cavity, a space is formed between an external surface of the main body at a part without the compression ribs and an internal wall of the cover, and the bore is closed by a compressive force applied from the internal wall of the cover to the septum via the compression ribs.

2. A needleless port comprising: a pedestal that forms a part of a flow channel and has an opening to the flow channel; a cover that is engaged with the pedestal at a position corresponding to the opening and has a cavity that opens to exterior at a predetermined distance from the opening; and a septum that is held in the cavity and is made of a resilient material with a substantial passageway for allowing an insertion member to be inserted from the exterior to the opening, wherein

the septum comprises a main body that extends from an inner end on the pedestal side toward an outer end on the exterior side of the cavity of the cover, with

the substantial passageway being formed between an inner-end face and an outer-end face thereof, and compression ribs provided on sides of the main body,

the main body has a cross section in a direction orthogonal to the substantial passageway of a shape having a dimension in a length direction larger than that in a breadth direction,

the substantial passageway includes an unpenetrated region and a bore, the unpenetrated region having a predetermined depth from the outer-end face of the main body, and the bore extending from the unpenetrated region to the inner-end face of the main body and having a lateral section of a spindle shape whose major axis extends in the same direction as the length direction,

the compression ribs are provided at the both side ends of the main body in the breadth direction so as to extend along the axial direction of the substantial passageway,

the cavity of the cover has a circular cross section whose diameter is smaller than a distance between the external surfaces of the compression ribs, and

with the septum being held inside the cavity, a space is formed between an external surface of the main body at a part without the compression ribs and an internal wall of the cover, and the bore is closed by a compressive force applied from the internal wall of the cover to the septum via the compression ribs.

3. The needleless port according to claim 1 or 2, wherein

the septum has, on an inner end of the main body, an inner-end plate that has an oval shape whose major axis extends in the same direction as the breadth direction of the main body,

a major axis of the inner-end plate is larger than an inside diameter of the internal wall of the cover, and

with the septum being held inside the cavity, a compressive force acting in the major axis direction is applied from the cover to the inner-end plate.

4. The needleless port according to claim 1 or 2, wherein

the septum has, around an outer end of the main body, an outer-end plate that is exposed to outside of the cover and is larger in size than an inside diameter of the cover at an outer end of the cover.

5. The needleless port according to claim 1 or 2, wherein

lengths in the major axis and the minor axis of the section of the bore gradually become larger from the outer-end face of the main body toward the

inner-end face of the main body.

6. The needleless port according to claim 1 or 4, wherein
the septum has, on an outer end thereof, a surface depression portion which is formed at a central area to be substantially level and depressed in relation to an area surrounding the central area.

7. The needleless port according to claim 1 or 2, wherein
a surface of the outer-end plate is flat.

8. The needleless port according to any one of claims 1 to 4, wherein
a length Ls0 of the main body in a state in which the septum is not mounted inside the cover is smaller than a length Lc of the cover at a portion for holding the main body therein.

9. The needleless port according to claim 8, wherein
with the septum being held inside the cover, an expansion ratio is within a range of 5% to 40%, the expansion ratio being calculated by dividing an expanded length of the septum by the length Lc.

10. The needleless port according to claim 1 or 2, wherein
the internal wall of the cover forming the cavity is tapered so that the diameter of the cavity section gradually becomes larger from the inner end thereof toward the outer end thereof along an axis of the cavity.

11. The needleless port according to any one of claims 1 to 4, 8 and 9, wherein
a ratio of the distance between the external surfaces of the compression ribs to the inside diameter of the cover and a ratio of the length in the major axis of the inner-end plate to the inside diameter of the cover are each within a range of 1.05 to 1.4.

12. The needleless port according to claim 11, wherein
a ratio of a dimension in the breadth direction of the main body to the inside diameter of the cover and a ratio of a minor axis of the inner-end plate to the inside diameter of the cover are each within a range of 0.8 to 1.0.

13. The needleless port according to claim 1 or 2, wherein

an area size of a cross section of the space between the external surface of the main body at the portion without the compression ribs and the internal wall of the cover gradually becomes larger from an outer end of the cover toward an inner end of the cover.

14. The needleless port according to claim 1 or 2, wherein

a ratio of the predetermined depth of the slit to a height of the main body of the septum is within a range of 0.04 to 0.60, the predetermined depth being measured in a direction of the passageway.

15. The needleless port according to claim 1 or 14, wherein

the predetermined depth of the slit measured in a direction of the passageway is within a range of 0.2 mm to 3.0 mm.

16. The needleless port according to claim 3, wherein

an annular rib is provided around the opening of the pedestal, the annular rib projecting toward the cover, and

the inner-end plate of the septum is sandwiched between the internal wall of the cover and the annular rib so that the annular rib engages with a bottom surface of the inner-end plate, thereby establishing liquid-tightness.

17. The needleless port according to claim 16, wherein

the internal wall of the cover has one or more indents that are to be engaged with an external surface of the septum.

18. The needleless port according to claim 1 or 2, wherein

an inner peripheral portion at an outer end of the cover is chamfered.

19. The needleless port according to claim 1 or 2, wherein

a material of the septum is one of silicon rubber, isoprene rubber, butyl rubber, nitrile rubber and thermoplastic elastomer.

20. A method of manufacturing the needleless port according to claim 1 or 2, wherein

in a process of molding the septum, a knob is formed on the outer-end face of the septum at a position being displaced from a position of the slit, and

when mounting the septum inside the cavity, the knob is put through the

cavity from the inner end thereof to the outer end thereof, and thereafter the knob is pulled while the septum is pushed into the cavity.

21. The manufacturing method according to claim 20, wherein
after the septum is mounted inside the cavity, the knob is cut off at a basal portion thereof.

22. The manufacturing method according to claim 20, wherein
the knob is tube-shaped, with the basal portion thereof being formed so as to surround the slit, and
after the septum is pushed into the cavity, the tube-shaped knob is turned inside out so as to cover an external surface of the cover.